

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>		1. CONTRACT ID CODE		PAGE 1 OF 1 PAGES	
2. AMENDMENT/MODIFICATION NO. R0002		3. EFFECTIVE DATE 02/11/05		4. REQUISITION/PURCHASE REQ. NO.	
5. PROJECT NO. (If applicable)		6. ISSUED BY CODE W911KB		7. ADMINISTERED BY (If other than Item 6) CODE W911KB	
US ARMY ENGINEER DISTRICT, AK CEPOA-CT (W911KB) PO BOX 6898 ELMENDORF AFB, AK 99506-6898 JAMES HOLLOWAY (907)753-2528		US ARMY ENGINEER DISTRICT, AK CEPOA-CO-NAO PO BOX 35066 (BLDG 3025) FAIRBANKS, ALASKA 99703-0066			
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(X) 9A. AMENDMENT OF SOLICITATION NO. W911KB-05-B-0001	
				9B. DATED (SEE ITEM 11) 01/13/05	
				10A. MODIFICATION OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 13)	
CODE 089C4		FACILITY CODE			

**11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS**

- ☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☒ is extended, ☐ is not extended.
- Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
- (a) By completing Items 8 and 15, and returning 0 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

**12. Accounting and Appropriation Data (If required)**

**PROJECT TITLE AND LOCATION: UTILIDOR REPAIR, FT WAINWRIGHT, ALASKA (FTW288)**

**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

- (X) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
- B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc). SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
- C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
- D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor ☒ is not, ☐ is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

**14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)**

**BID OPENING DATE IS EXTENDED TO 22 FEB 05, 2:00 pm, local time, at the US Army Corps of Engineers, 2204 Third Street, Elmendorf AFB, Alaska.**

**NOTICE TO OFFERORS: PLEASE MARK OUTSIDE OF ENVELOPE IN WHICH BID IS SUBMITTED TO SHOW AMENDMENTS RECEIVED. YOU ARE REQUIRED TO ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE REVERSE SIDE OF STANDARD FORM 1442.**

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF SIGNER (Type or print)	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED

AMENDMENT TO SOLICITATION  
CONTINUATION SHEET

W911KB-05-B-0001

Amendment No. R0002

Page: 2

a. The following revised drawings are substituted for the superseded drawings and revised as indicated.

Drawing No. F-893-40-02, Ref No. C2.04  
F-893-40-02, Ref No. C2.06  
F-893-40-02, Ref No. C3.10.3  
F-893-40-02, Ref No. C3.15.1  
F-893-40-02, Ref No. C3.15.4  
F-893-40-02, Ref No. C3.15.6  
F-893-40-02, Ref No. C3.23.2  
F-893-40-02, Ref No. C3.23.5  
F-893-40-02, Ref No. C3.27.5

b. The following revised documents are substituted for the superseded documents. The identifier "AM #2" appears before and after new and revised material, except as noted below.

TECHNICAL SPECIFICATIONS:

SECTION 02511

Paragraph 3.4.1 Pre-Cast Concrete Block Pipe Support

SECTION 02560

Paragraph 3.1.2.2 Manhole Ladders (Deleted)

SECTION 09900

Paragraph 1.3 APPLICATOR'S QUALIFICATIONS (Deleted)

Paragraph 1.3.1 SSPC QP 1 Certification (Deleted)

**NOTE:** Revisions within the following documents do not contain the above referenced identifiers.

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c. The following section (including submittal register is deleted).

NONE

d. The following section (including submittal register is added).

NONE

e. NOTICE TO BIDDERS: PLEASE MARK OUTSIDE OF ENVELOPE IN WHICH BID IS SUBMITTED TO SHOW AMENDMENTS RECEIVED. YOU ARE REQUIRED TO ACKNOWLEDGE RECEIPT OF THIS AMENDMENT ON THE REVERSE SIDE OF STANDARD FORM 1442.

<b>SOLICITATION, OFFER, AND AWARD</b> (Construction, Alteration, or Repair)		1. SOLICITATION NUMBER  W911KB-05-B-0001	2. TYPE OF SOLICITATION <input checked="" type="checkbox"/> SEALED BID (IFB) <input type="checkbox"/> NEGOTIATED (RFP)	3. DATE ISSUED  01/13/05	PAGE OF PAGES
<b>IMPORTANT - The "offer" section on the reverse must be fully completed by the offeror.</b>					
CONTRACT NUMBER		5. REQUISITION/PURCHASE REQUEST NUMBER		6. PROJECT NUMBER	
ISSUED BY  US ARMY ENGINEER DISTRICT, ALASKA CEPOA-CT-CM (W911KB) PO BOX 6898 ELMENDORF AFB, AK 99506-6898		CODE  W911KB	8. ADDRESS OFFER TO  SEE ITEM 7		
FOR INFORMATION CALL 		A. NAME James Holloway		B. TELEPHONE NUMBER (Include area code) (NO COLLECT CALLS) (907)753-2528	

#### SOLICITATION

**NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".**

**1. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying number, date):**

NAICS: 237990

PROJECT TITLE/LOCATION: Utilities Upgrade, Ft Wainwright, Alaska

COMPETITIVE 8(A) SET-ASIDE

DESCRIPTION OF WORK: This is a competitive 8(a) set-aside solicitation that is limited or restricted geographically to the Alaska Small Business Administration District servicing area. All 8(a) certified firms serviced by the Alaska District Office or all 8(a) certified firms with a bona fide place of business in the Alaska District Office are deemed eligible to submit offers. Competition will not be restricted by stage (transitional or developmental) of 8(a) program participation. Project consists of repairing approximately 3650 feet of utilidor systems on Ft Wainwright, located in Fairbanks, Alaska. Repairs include complete replacement of sewer, water, steam and condensate lines within existing utilidor structures on Santiago Avenue, including service to buildings. Work will also include enlargement of some existing manholes and asbestos abatement. Responders are advised that this requirement may be delayed, canceled, or revised at any time during the solicitation, selection, evaluation, negotiation, and/or final award process based on decisions related to DoD changes. Solicitation will be provided free of charge on our website - <https://ebs.poa.usace.army.mil/AdvertisedSolicitations.asp>

**\*\*CONTRACT AWARD WILL BE SUBJECT TO AVAILABILITY OF FUNDS (See 52.232-18)**

1. The Contractor shall begin performance within <u>10</u> calendar days and complete it within <u>AM#1... 545... AM#1</u> <del>444</del> calendar days after receiving	
<input type="checkbox"/> award, <input checked="" type="checkbox"/> notice to proceed. This performance period is <input checked="" type="checkbox"/> mandatory, <input type="checkbox"/> negotiable. (See <u>52.211-10</u> .)	
2A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.)	12B. CALENDAR DAYS  10
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	

#### 3. ADDITIONAL SOLICITATION REQUIREMENTS:

Sealed offers in original and 1 copies to perform the work required are due at the place specified in Item 8 by 2:00 pm (hour) local time AM#2... 22 15 Feb 2005 ...AM#2 (late). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

An offer guarantee ☒ is, ☐ is not required.

All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

AMENDMENT 0002 (02/11/05)

19. QUESTION: Scope of work general notes #17 - Previous projects have scraped off the mastics and waterproofing between the lids and between lids and walls, but previously there has not been any waterproofing on the other surfaces that you are asking to be scraped to bare concrete on this project . Are we to assume that the utilidors and manholes were previously waterproofed and needs to be removed? This is a major item of work that will probably need to be sandblasted to meet this requirement. If it hasn't been waterproofed before you are adding undue costs to this project. Please clarify what you intended by this note.

ANSWER: No sandblasting will be required. Bid on note as is.

20. QUESTION: Ladders Section 02560-3.1.2.2 Plans S1.03. Can the ladders in the specs be used instead of the ladders shown in the drawings? Are we to replace all ladders or just where indicated?

ANSWER: Use ladders shown on the drawings. All existing ladders shall not be replaced. Provide new ladders at new accesses.

21. QUESTION: Access Doors Section 02560-3.1.2.4 MH H5-7-7 Drawing C3.15.1, MH H5-7-6 Drawings C3.17.1 thru C3.17.7, MH H5-4-3 Drawing C3.23.4 and MH H5-1-6 Drawings C3.28.1 thru C3.28.6. The drawings do not say these access doors are existing, to be removed or to be new. These access doors are shown on the drawings but are not labeled or noted for what you want done. Please clarify.

ANSWER: Remove and replace manhole access hatches for H5-7-7 and H5-4-3. Access hatches to remain for H5-7-6 and H5-1-6.

22. QUESTION: Block Pipe Supports Section 02511-3.4.1 Drawing C4.06. The specs say we are only to use the concrete block for Hydrants and then goes on to say how to use them for sewer. It mentions that they are to be adjustable but does not explain how they are to be adjusted. The drawings also show the block support but do not show any detail on how to make a concrete block adjustable. Can we use concrete block for sewer pipe supports? If yes are you going to supply a detail on an adjustable concrete block?

ANSWER: Use metal support racks in conjunction with concrete block. Contractor to provide support system.

23. QUESTION: For Clarification - Drawing C3.05.6 MH I5-4-5 shows the sump pit to be 4 inches deep, but on Drawing C5.01.3 shows 24 inch pit.

ANSWER: The details on sheet C5.01.3 are general and diagrammatical in nature. There are no specific notes on sheet C5.01.3 regarding the dimensions of the sump pits. The notes on sheets for individual plans and sections (such as C3.05.5 and C3.05.6) should be used for the size of sump pits. The details on sheet are drawn "Not To Scale". The dimensions shown on the sheet only refer to float switch levels. Finally, in the "Typical New Duplex Sump Pump Detail" there is a note "MH Floor (for MH I5-4-5)". This note points to the general location of the MH floor for MH I5-4-5 which as can be seen is slightly higher than the sump pit floor. This matches the shallow pit shown and described in detail on sheets C3.05.5 and C3.05.6.

24. QUESTION: On Drawing C3.27.5 Plan titles for Manhole H5-1-9 state "Without Option 6". Should this note be "Without Option 7" according to the Overall Site Plan on C2.01? Please clarify.

ANSWER: It should be without option 7.

25. QUESTION: Several notes on C1.01 and C1.02 require pressure gauges, condensate drains, and water system drains on both sides of valves. The detailed plans and sections do not always show them on both sides and in some instances space is not provided on the piping. Please clarify if we follow the drawings or must adhere to the notes.

ANSWER: Pressure gauges, condensate drains and water system drains should be provided on both sides of valves as described in notes on sheets C1.01 and C1.02 even if they are not specifically shown on individual Manhole Plan and Section sheets.

26. QUESTION: On C3.15.6 Section R-R for the hydrant piping label the piping in two places as 12" Water. Please clarify if these should be 6" Water.

ANSWER: It is 6" water.

27. QUESTION: What is meant by the note on the New Steam Plan on C3.23.7? EJ-018 is shown as a 12" expansion joint with or without Option 5 and the piping is also 12". Please clarify.

ANSWER: With option 5, EJ-018 is required to have flanged connections per the Steam and Condensate Expansion joint Schedule 1 on sheet C5.02.1. Without option 5, EJ-018 is required to have welded connections per NOTE on sheet C3.27.7.

28. QUESTION: On C5.02.1 and .2 there are several expansion loops noted in the table. These loops are not shown on the drawings nor are dimensions shown on the referenced sheets. Please provide locations and a design.

ANSWER: "Expansion Loops" is being used as a general term to cover expansion elbows, bends and loops. In the specific locations where "Expansion Loops" are referenced, there are no anchors from the main manhole to the building. The various bends and offsets in the piping are to accommodate the expansion.

29. QUESTION: On Sheets C2.04, C3.10.3, and C3.10.4 the condensate branch to Bldg. 3702 is shown as 2" but on Sheet C3.11.2 and C5.03.2 it is shown as 1-1/2". Please clarify.

ANSWER: The condensate branch from MH I5-1-2 to Building 3702 should be 1-1/2" per sheets C3.11.2 and C5.03.2. The transition should be a reducer just on the building side of the 2" expansion joint, EJ-161.

30. QUESTION: C2.06 shown the new condensate branch from H5-7-9 to Bldg. 3701 as 1-1/2" but C3.14.2 shows it as 2". Please clarify.

ANSWER: The condensate branch from MH H5-7-9 to Building 3701 should be 2" per sheets C3.13.3, C3.13.4, C3.14.2 and C5.03.3.

31. QUESTION: General Note 17 on sheet C1.01 discusses the cleaning of waterproofing material off the outside of the existing utilidors. On the areas indicated to be cleaned "down to bare concrete" will the concrete be required to

be cleaned down to the porous nature of the material or will surface staining be acceptable?

ANSWER: Surface staining is acceptable.

32. QUESTION: Paragraph 3.1.2.3e. Requires butt hinges on round manhole covers. Please clarify?

ANSWER: This paragraph does not pertain to round manhole covers. No hinges are required on round manholes covers.

33. QUESTION: Drawings C2.04, C2.05, and C2.07 call for fire hydrant manholes to be raised 24 inches and there are not details found. Please clarify?

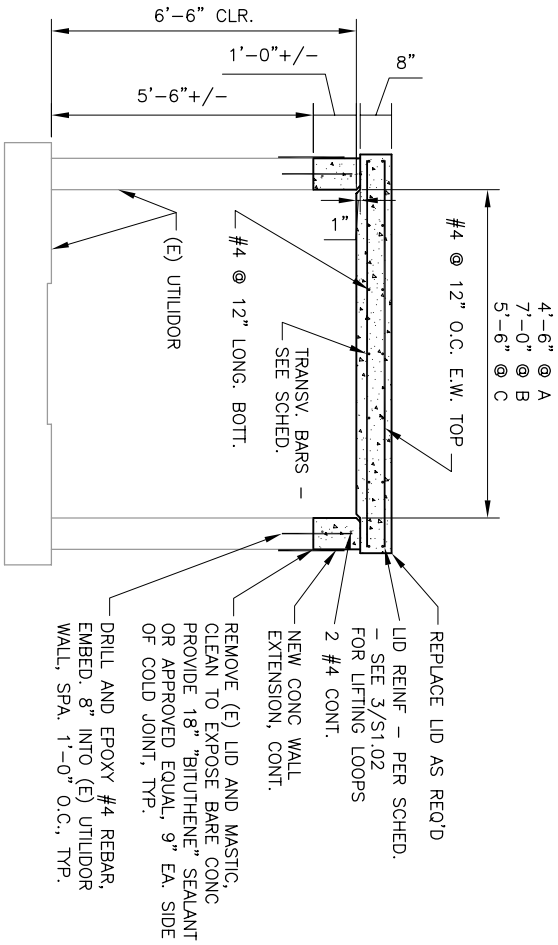
ANSWER: The response to this question is in a narrative format and answered with the attached PDF of drawing sheet Reference Number S1.05.

34. QUESTION: Welding Inspections Section 05093 Requires 100% visual inspection of each individual weld pass. Will 10% random visual inspections be acceptable for 05093-3.2.2.a and 05093-3.2.2.b? as allowed in previous utilidor projects.

ANSWER: No, follow the requirements for welding inspection as specified.

35. QUESTION: Section 02533-2.1.4 Describes a victaulic number 78 snap joint coupling, which is not available for ductile iron products. The victaulic 31 coupling referenced in the specification is for installation of ductile iron piping, but is not a hinge type.

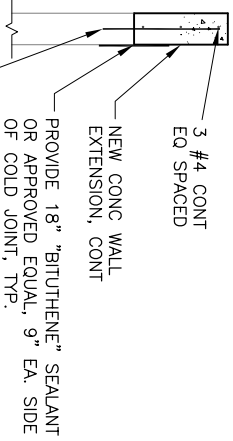
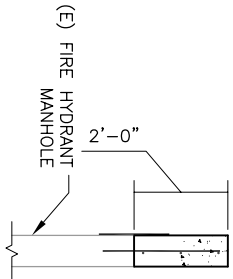
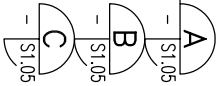
ANSWER: This response is in narrative format. Section 2533, paragraph 2.1.4 is changed to: 2.1.4 Disconnect Couplings. Cleanout caps shall be secured in place with a disconnect coupling, victaulic style 31 or equal. Caps for the sanitary sewer clean-outs shall be grooved ductile or gray cast iron disks. The caps shall be manufactured to mate with the quick disconnect couplings. Cap: Victaulic part no. 60-C or equal.



LID REINF. SCHEDULE	
DETAIL	REINF.
A	#5 @ 6" O.C.
B	#6 @ 6" O.C.
C	#5 @ 6" O.C.

### RAISED UTILIDOR SECTION, TYP.

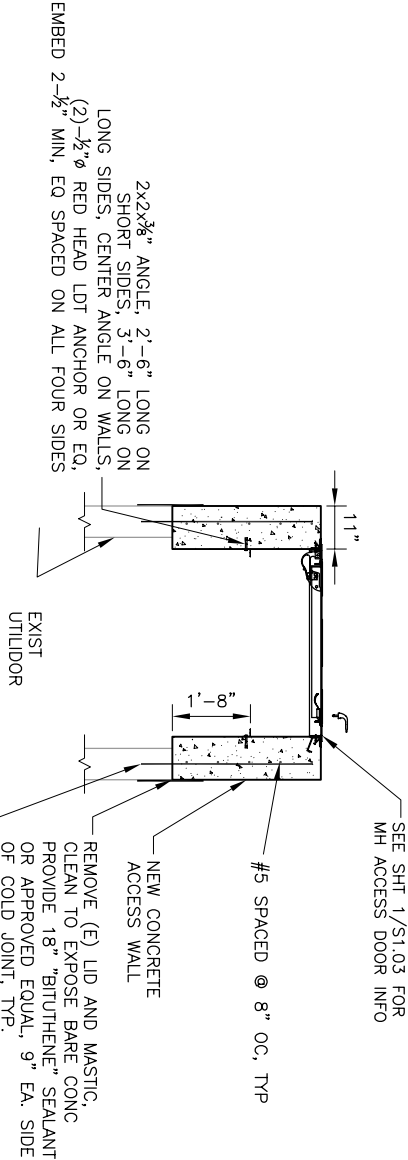
SCALE: 1/2"=1'-0"



- NOTES:
1. LAP HORIZONTAL BARS PER CONC. NOTES S1.02
  2. SEE S1.02 FOR FIRE HYDRANT MANHOLE LID

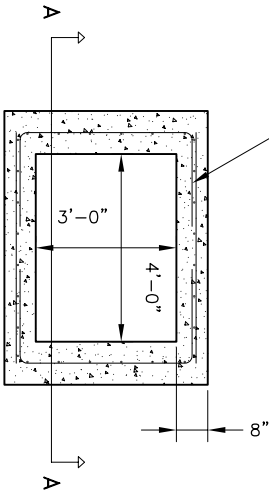
### RAISED FIRE HYDRANT MANHOLE SECTION, TYP

SCALE: 1/2"=1'-0"



### SECTION A-A

#5 BARS @ 8" O.C.  
LAP PER CONC  
NOTES SHT S1.01



### PLAN VIEW

### MH H5-1-1L

SCALE: 1/2"=1'-0"



52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
AM#2...	
8.8% 8.7%(Anchorage, Alaska)	7.2% 6.9%(Alaska)
15.8% 15.1% (Locations outside City of Anchorage)	...AM#2

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

- (1) Name, address, and telephone number of the subcontractor;
- (2) Employer's identification number of the subcontractor;
- (3) Estimated dollar amount of the subcontract;
- (4) Estimated starting and completion dates of the subcontract; and
- (5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Ft Wainwright, Alaska, Fairbanks, North Star Borough

(End of provision)



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SECTION 02511

WATER DISTRIBUTION SYSTEMS IN UTILIDORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASME INTERNATIONAL (ASME)

ASME B16.26	(1988) Cast Copper Alloy Fittings for Flared Copper Tubes
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ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2003a) Carbon Structural Steel
ASTM A 47	(1999) Ferritic Malleable Iron Castings
ASTM A 48	(2000) Gray Iron Castings
ASTM A 53	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 126	(1995; R 2001) Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 307	(1993) Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A 536	(1994; 1999e1) Ductile Iron Castings
ASTM A 563	(2000) Carbon and Alloy Steel Nuts
ASTM A 780	(2000) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM B 209	(2000) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 32	(2000) Solder Metal
ASTM B 88	(1999) Seamless Copper Water Tube

ASTM C 272	(1991; R 1996) Water Absorption of Core Materials for Structural Sandwich Constructions
ASTM C 518	(1991) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM D 1621	(2000) Compressive Properties of Rigid Cellular Plastics
ASTM D 2000	(2000) Rubber Products in Automotive Applications
ASTM D 2842	(2001) Water Absorption of Rigid Cellular Plastics
ASTM D 4586	(2000) Asphalt Roof Cement, Asbestos Free

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(1999) Hypochlorites
AWWA B301	(1999) Liquid Chlorine
AWWA C104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110	(1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (75 mm through 1200 mm), for Water and Other Liquids
AWWA C111	(2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	(1999) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water
AWWA C203	(1997) Coal-Tar Protective Coatings and Lining for Steel Water Pipelines - Enamel and Tape - Hot Applied
AWWA C205	(1995) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 in. and Larger - Shop Applied
AWWA C207	(2001) Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)

AWWA C500	(1993) Metal-Seated Gate Valves for Water Supply Service
AWWA C502	(1994) Dry-Barrel Fire Hydrants
AWWA C512	(1999) Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service
AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1997) Grooved and Shouldered Joints
AWWA C651	(1999) Disinfecting Water Mains

ASME INTERNATIONAL (ASME)

ASME B16.3	(1998) Malleable Iron Threaded Fittings
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MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-110	(1996) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
MSS SP-80	(1997) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 325M	(1991) Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids
NFPA 24	(1995) Installation of Private Fire Service Mains and Their Appurtenances
NFPA 49	(1994) Hazardous Chemicals Data
NFPA 704	(1996) Identification of the Fire Hazards of Materials for Emergency Response

NSF INTERNATIONAL (NSF)

NSF 61	(2002e) Drinking Water System Components - Health Effects
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THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 21	(1991) White or Colored Silicone Alkyd Paint
SSPC Paint 25	(1997) Oxide, Zinc Oxide, Raw Linseed Oil



and Alkyd Primer (Without Lead or Chromate Pigments).

## 1.2 PIPING

This section covers water distribution lines, water service lines, connections to building services as shown on the drawings, fire lines and fire hydrants. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

### 1.2.1 Piping for Water Distribution Lines

Piping for water distribution lines shall be ductile iron, unless otherwise shown or specified.

### 1.2.2 Piping for Water Service Lines

Piping for water service lines less than 4 inches and greater than or equal to 3 inches in diameter shall be galvanized steel or ductile iron, unless otherwise shown or specified. Piping for water service lines less than 3 inches shall be copper tubing, unless otherwise shown or specified.

### 1.2.3 Piping for Fire Lines

Piping for fire lines shall be ductile iron, unless otherwise shown or specified.

### 1.2.4 Standard Products

The equipment to be furnished under this specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be the products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. The products of any reputable manufacturer regularly engaged in the commercial production of water distribution equipment will not be excluded on the basis of minor differences, provided all essential requirements of this specification relative to materials, capacity and performance are met.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with SECTION 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Materials

Alignment Guides; G

Hangers

Couplings

Gaskets

Pipe

Valves

Fire Hydrants

Fittings

Pipe Supports; G

Anchors

SD-08 Manufacturer's Instructions

Manufacturer's Recommendations

SD-06 Test Reports

Hydrostatic tests

Disinfection

#### 1.4 SUBMITTALS SUPPLEMENTAL

See paragraphs below for further descriptions of submittals required by paragraph SUBMITTALS:

##### 1.4.1 Materials

Manufacturer's descriptive data, catalog cuts, and brochures for each type and size of the following: alignment guides, and expansion joints.

##### 1.4.2 Pipe Supports

Calculation of pipe supports shall be submitted with support system descriptive data, see submittal in SECTION 02560 UTILIDOR SYSTEM.

##### 1.4.3 Anchors; G

Calculation of pipe anchors shall be submitted with anchor sizes and drawings showing location and details of anchor. At a minimum anchors shall be placed near the locations shown on the drawings.

##### 1.4.4 Manufacturer's Recommendations

Manufacturer's recommendations for each material or procedure to be utilized which is required to be in accordance with such recommendations. The Contractor shall have a copy of the manufacturer's instructions

available at the construction site at all times and shall follow these instructions unless otherwise directed by the Contracting Officer.

#### 1.4.5 Hydrostatic tests

Submit a hydrostatic test procedure describing method including method proposed for disposal of wastewater.

#### 1.4.6 Disinfection

Submit a disinfection and test procedure describing method of disinfection with drawings showing proposed flush points, proposed chlorine injection points, method for disposal of wastewater and proposed sampling locations 30 days prior to disinfection being conducted. Submit satisfactory test results conducted by a laboratory certified by the State of Alaska.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

Materials shall conform to the respective specifications and other requirements specified below: Pipe and fittings that are connected to anchors shall be steel. All water system components shall comply with NSF 61 requirements.

#### 2.2 PIPE

##### 2.2.1 Ductile-Iron Pipe

Ductile-Iron pipe shall conform to AWWA C151, Class 53, working pressure not less than 150 psi, unless otherwise shown or specified. Pipe shall be cement-mortar lined in accordance with AWWA C104. Linings shall be standard. Pipe 4 inches and larger shall be ductile iron.

##### 2.2.2 Galvanized-Steel Pipe, Less Than 4 Inches

Galvanized steel pipe shall conform to ASTM A 53, standard weight.

##### 2.2.3 Copper Tubing

Copper tubing shall conform to ASTM B 88, Type K, annealed.

#### 2.3 JOINTS

##### 2.3.1 Ductile-Iron Pipe

##### 2.3.1.1 Mechanical Joints

Mechanical joints shall be of the restrained stuffing box type and shall conform to AWWA C606. Pipe joints shall be cut grooved and shouldered joints in accordance with AWWA C606 with a minimum working pressure of 150 psi. The coupling shall provide for full circumferential bearing against the face of the pipe groove or shoulder end, with a positive locking action when the components being joined are in line. Restrained joints shall be

of the type that cannot be separated without failure of the pipe joint material.

Rubber gaskets and lubricants shall be as specified by the manufacturer of the jointing system and shall conform to the applicable requirements of ASTM D 2000.

#### 2.3.1.2 Restrained Push-On Joint Fittings

Restrained Push-on joints shall conform to AWWA C111. Restrained push-on joint fittings shall be TR Flex Fittings as manufactured by U.S. Pipe or Flex-Ring Fittings as manufactured by American Pipe, or equal.

Rubber gaskets and lubricant shall be as specified by the manufacturer of the jointing system and shall conform to the applicable requirements of AWWA C111.

#### 2.3.1.3 Flanges

Flanges shall conform to AWWA C115 and/or AWWA C110. Flanges shall be flat faced.

#### 2.3.2 Steel Pipe, Galvanized

##### 2.3.2.1 Mechanical Joints

Pipe joints for steel piping 2 inches and larger shall be cut grooved and shouldered joints in accordance with AWWA C606 with a minimum working pressure of 150 psi. All joints are to be flexible and use the same gasket material as specified for ductile iron pipe.

##### 2.3.2.2 Flanges

Flanges shall conform to AWWA C207. Flanges shall be flat faced.

#### 2.3.3 Copper Tubing

Joints shall be solder type.

#### 2.4 ISOLATION JOINTS

Isolation joints shall be installed between nonthreaded ferrous and nonferrous metallic pipe, fittings, and valves. Isolation joints shall consist of a sandwich-type flange isolation gasket of the dielectric type, isolation washers, and isolation sleeves for flange bolts. Isolation gaskets shall be full faced with outside diameter equal to the flange outside diameter. Bolt isolation sleeves shall be full length. Units shall be of a shape to prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

#### 2.5 FITTINGS AND SPECIALS

Fittings and specials for ductile-iron pipe and steel pipe may be

interchanged where applicable. Mating surfaces between steel and iron flanges shall be plain faced. Protective materials for fittings and specials that cannot be mechanically lined and coated shall be lined and coated by hand using the same materials as are used for the pipe with the same number of applications of each material carefully and smoothly applied.

#### 2.5.1 For Ductile-Iron Pipe

Fittings and specials shall have a pressure rating no less than that of adjoining pipe, unless otherwise specified. Fittings and specials for flanged joint pipe shall conform to AWWA C110. Fittings required on the drawings that are not covered in AWWA C110 shall have AWWA flanges and be based on AWWA C110 design principles. Fittings and specials for cut grooved and shouldered end pipe shall conform to AWWA C606 without field preparation. Malleable iron shall be ASTM A 47. Ductile iron shall be ASTM A 536.

#### 2.5.2 For Galvanized-Steel Pipe Less Than 4 Inches

Steel fittings shall be galvanized. Screwed fittings shall conform to ASME B16.3. Flanged fittings shall conform to AWWA C207. Dresser-type fitting shall not be used.

#### 2.5.3 Copper Tubing System

Fittings and specials shall be flared and conform to ASME B16.26.

### 2.6 VALVES

#### 2.6.1 Gate Valves

Gate valves shall be designed for a working pressure of not less than 150 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating wheel shall have an arrow cast in the metal, indicating the direction of opening. Each valve shall have a operating wheel.

a. Valves 2 inches and smaller shall be union bonnet all bronze and shall conform to MSS SP-80, Type 1, Class 150.

b. Valves larger than 2 inches shall be iron body, bronze mounted, and shall conform to AWWA C500, Class 125. Valves shall be non-rising stem and no raised faces.

#### 2.6.2 Combination Air Valves

Combination air valves shall be single housing, combining both an air/vacuum relief valve and an air release valve. The air/vacuum portion shall automatically exhaust large quantities of air during filling of the pipeline and automatically relieve vacuum during draining of the pipeline. The air/vacuum large orifice size shall be a minimum of 2 inches. The air release portion shall automatically release small pockets of air that

collect during operation. The small orifice size shall be 3/32 inches. Bodies and covers shall be of gray cast iron conforming to ASTM A 126, Class B, or ASTM A 48, Class 35, or ductile iron conforming to ASTM A 536, Grade 65-45-12, with stainless steel or plastic float. The valves shall be manufactured and tested in accordance with AWWA C512. Valve shall be as manufactured by Val-Matic Valve and Manufacturing Corp., Elmhurst, IL, or equal.

#### 2.6.3 Hose Bib

Hose bib shall be brass with 3/4 inch male inlet threads, hexagon shoulder, and 3/4 inch hose connection. Faucet handle shall be securely attached to stem. Hose bib shall incorporate a threaded cap for the male end with chain securely fastened to bib.

#### 2.6.4 Ball Valve

Threaded ends 2 inch and smaller: 400# WOG., forged brass two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem meeting Manufacturers Standardization Society MSS SP-110.

#### 2.7 FIRE HYDRANTS

Hydrants shall be dry-barrel type conforming to AWWA C502 with valve opening at least 5 inches in diameter and designed so that the flange at the main valve seat can be removed with the main valve seat apparatus remaining intact, closed and reasonably tight against leakage and with a breakable valve rod coupling and breakable flange connections located no more than 8 inches above the ground or concrete lid. Hydrants shall have a 6 inch bell connection, two 2-1/2 inch hose connections and one 4-1/2 inch pumper connection. Outlets shall have American National Standard fire-hose coupling threads. Working parts shall be bronze. Design, material and workmanship shall be similar and equal to the latest stock pattern ordinarily produced by the manufacturer. The exterior of fire hydrants below the breakable coupling shall be painted as specified for pipes inside the utilidor, with the added requirement of two (total) coats of the asphalt varnish. Hydrants shall be painted with one coat of zinc oxide primer conforming to SSPC Paint 25, and two finish coats of silicone alkyd enamel conforming to SSPC Paint 21, of the installation's standard colors or as directed by the Contracting Officer. Suitable bronze adapter for each outlet, with caps, shall be furnished. Hydrants shall be Mueller or equal.

#### 2.8 DISINFECTION

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

## 2.9 GALVANIZED COATINGS

Repair shall conform to ASTM A 780 for damaged and uncoated areas of hot-dip galvanized coating.

## 2.10 MASTIC

Mastic shall conform to ASTM D 4586, Type I.

## 2.11 INSULATION AND JACKETING

### 2.11.1 Insulation for Piping in Utilidors

Insulation for piping, fittings, and valves shall be closed cell elastomer foam rubber, polyurethane foam, polyethylene foam, or extruded polystyrene.

Insulation for piping, fittings, and valves in manholes and to a point 5 feet into the utilidors shall be the same as specified for the main lines. Insulation shall be factory or field applied. Laminated construction shall not be used. Insulation on piping in utilidor shall be covered with aluminum or nonmetallic jacket and insulation in manholes shall be covered with an aluminum jacket.

### 2.11.2 Aluminum Jacket

Jacket shall be smooth sheet, 0.016 inch nominal thickness; ASTM B 209, Type 3003, 3105, or 5005.

### 2.11.3 Nonmetallic Jacket

Nonmetallic jackets shall be of the AWJ (All Weather Jacket) type. Nonmetallic jacket shall consist of a 0.042 pounds per square foot fiberglass fabric impregnated with chlorosulfonated polyethylene (Hypalon) and a 0.0015-inch (1.5 mils) polyvinyl fluoride film (Tedlar) bonded to it. Overall thickness of the composite shall be 0.01 inch and weigh approximately 0.073 pounds per square foot. Jacket may be either field or factory applied to the insulation.

### 2.11.4 Bands

Bands for aluminum jacket shall be 3/8 inch wide and 32 gauge thickness made of aluminum or annealed stainless steel. Bands for insulation shall be 1/2 inch wide and 32 gauge thickness made of annealed stainless steel.

### 2.11.5 Insulation for Flanges, Unions, and Fittings

Flanges, unions, and fittings shall be insulated with removable and reusable jackets. The insulation shall have essentially the same thermal characteristics and thickness as the adjoining piping. Removable valve blankets shall be secured with nylon straps and buckles.

### 2.11.6 Insulation Thickness

Provide pipe insulation thicknesses according to the following schedule:

Pipe size	Insulation Thickness
3/4"	1"
1" and larger In manhole and 5 feet into utilidor	1-1/2"  1"

2.11.7 Water Valve and Equipment Insulation Cover

- a. Removable, one-piece sewn cover construction with Velcro fasteners.
- b. Thread: High temperature bonded multi-filament, Teflon coated. Rated for 475 degrees F maximum.
- c. Seams: Double sewn, 8 stitches per inch minimum.
- d. Closures: 2 inch minimum flap. Provide end closures with drawstrings.
- e. Jacket: Silicon coated fiberglass fabric, 16 ounce/square yard minimum.
- f. Insulation: 2 inch thick Owens Corning thermal insulation wool or equal.

2.12 COAL-TAR COATING

Coal-tar coating shall be as specified in SECTION 02560 UTILIDOR SYSTEM.

2.13 POLYURETHANE AND POLYISOCYANURATE INSULATION

The manufacture of polyurethane and/or polyisocyanurate shall be based on the reaction of an isocyanurate with a polyol using a fluorocarbon blowing agent to form a rigid closed-cell structured polyurethane foam, or on the reaction of an isocyanurate with itself using a catalyst and a blowing agent to form a rigid closed-cell structured polyisocyanurate foam. The insulation foam shall be homogeneous, of uniform density and self-extinguishing. The insulation shall have the following properties:

Compressive Strength by ASTM D 1621 @74 degrees F	20 psi (min.)
Initial Thermal Conductivity K value @ 75 degrees F by ASTM C 518	0.014 BTU/(hr.ft. deg F) (max.)
Moisture Absorption by ASTM D 2842	3% by volume (max.)

2.14 POLYSTYRENE INSULATION

Extruded Polystyrene Pipe Insulation



Compressive Strength                      20 psi (min.)  
by ASTM D 1621 @74 degrees F

K value @ 75 degrees F  
by ASTM C 518                      0.259

Moisture Absorption                      0.5% by volume (max.)  
by ASTM C 272

#### Expanded Polystyrene Pipe Insulation

Compressive Strength                      25 psi (min.)  
by ASTM D 1621 @74 degrees F

K value @ 75 degrees F  
by ASTM C 518                      0.238

Moisture Absorption                      <2% by volume (max.)  
by ASTM C 272

### 2.15 SERVICE CLAMPS

Service clamps shall have a pressure rating not less than that of the pipe to be connected and shall be either the single or double flattened strap type. Clamps shall have a galvanized malleable iron body with cadmium plated straps and nuts. Clamps shall have rubber gaskets cemented to the body.

### 2.16 TAPPING SLEEVES

Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable iron, split-sleeve type with flanged or grooved outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of 150 psi. Bolts shall have square heads and hexagonal nuts. Longitudinal gaskets, and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in the pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 pound feet. Romac 202N service saddles may be used for 2" or less diameter connections to ductile iron pipe.

### 2.17 PIPE ALIGNMENT GUIDES

Pipe alignment guide type shall conform to SECTION 02559 HEAT DISTRIBUTION SYSTEMS IN UTILIDORS AND MANHOLES. Alignment Guides shall not require lubrication. The alignment guide shall not be affected by high humidity or mildly corrosive atmosphere. The guide surfaces shall be protected from accumulation of dirt and other foreign matter.

#### 2.17.1 Insulation Inserts at Pipe Supports and Pipe Carriers

Insulation inserts at pipe supports or carriers shall be a pre-manufactured system consisting of 60 psi extruded polystyrene insulation, an ultra-high density insulation insert with a minimum compressive strength of 900 psi, a vapor barrier and jacket to match the adjacent insulation system, and a galvanized steel shield. Insert and metal shield dimensions shall be appropriate for calculated loads.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Piping shall be installed as indicated on the drawings. Piping in manholes is shown in general configuration. Dimensions and lengths may vary slightly depending on pipe and fitting dimensions, location of supports and anchors, and fabrication. It shall be the Contractor's responsibility to insure that the final piping arrangement fits and conforms to the general configuration shown on the drawings. Pipe shall be cut accurately to measurements established at the site by the Contractor and shall be worked into place without springing or forcing. Care shall be taken not to weaken structural portions of the utilidor or manholes. Changes in pipe sizes shall be made with reducing fittings. Use of long screws and bushings will not be permitted. Tapping into existing systems shall be accomplished with as little system down time as possible. The Contractor shall submit his plan of action for tapping into existing systems for each tap.

#### 3.2 HANDLING

Pipe and accessories shall be handled so as to insure delivery to the utilidor in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. No other pipe or material of any kind shall be placed inside a pipe or fitting after the coating has been applied. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the utilidor and shall be kept clean during laying operations by plugging or other acceptable method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place. Storage facilities shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325M.

#### 3.3 CUTTING OF PIPE

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with a

mechanical type cutter. Wheel cutter shall be used when practicable. Squeeze type mechanical cutters shall not be used for ductile iron.

### 3.4 PIPE SUPPORTS AND HANGERS

Supports shall be designed to prevent the accumulation or provide for the drainage of liquid where water lines and sewer lines are placed on the same support. Pipe inserts and supports shall be an engineered system stamped and signed by a registered professional engineer, in accordance with SECTION 02560, UTILIDOR SYSTEM. The maximum spacing between pipe supports for straight runs shall be as follows unless a lesser amount is recommended by the pipe and/or coupling manufacturer. The Contractor shall submit design calculations showing the adequacy of the pipe support system.

Nominal Pipe Size (Inches)											
	1/2 to 1	1-1/4	1-1/2	2	2-1/2	3	4	6	8	10	12 and over
Max Span (Feet)	7	7	9	10	10	10	10	10	10	20	20

Nominal Tubing Size (Inches)											6 and over
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4		
Max Span (Feet)	5	5	6	7	8	8	9	10	10		10

Pipe supports shall be spaced not over 5 feet apart at heavy fittings and valves. Pipe shall be supported near each coupling and at multiple fittings as required. A support shall be installed not over 1 foot from each change in direction of piping. Straight runs of pipe over 15 feet supported on beams or brackets shall be provided with a cylinder type alignment guide with a guide spider attached to the pipe. No hangers or supports shall be suspended from removable manhole tops or removable utilidor lids, except as shown on the drawings. All pipe hangers and supports shall be hot dip galvanized after fabrication to provide a Coating Grade of 65 (average zinc coating of 1.5 ounces/square foot) in accordance with ASTM A 123/A 123M. Supports in utilidors and manholes that rest on the utilidor or manhole bottom shall be protected with two coats of coal-tar coating or equal applied to a minimum of the lower 12 inches of the support. Scratches and chips in the coating acquired during transport or installation shall be re-coated.

#### 3.4.1 Pre-Cast Concrete Block Pipe Support

AM#2...Concrete blocks shall not be used to support pipes within manholes and utilidors. Concrete blocks can be used for support within the fire hydrant manholes and fire hydrant serviceutilidors. The pre-cast concrete block pipe supports shall be attached to the floor using structural epoxy adhesive. Apply the adhesive to the full footprint of the block per

adhesive manufacturer's instructions. The bonding surfaces must be clean and sound. The surface may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials. Prepare the utilidor floor for the adhesive by grinding and pressure washing. If concrete supports are used to support sewer pipe, they must be constructed with support racks in such a way that they are vertically adjustable in 1/2 inch increments up to 4 inches in each direction to allow adjustment for settlement, but not lower than 4 inches from floor....AM#2

#### 3.4.2 Pipe Support Racks

Pipe support system shall be an engineered system design stamped and signed by a Registered Professional Engineer (P.E.).

#### 3.5 JOINT DEFLECTION

The maximum allowable deflection will be 15 minutes, unless a lesser amount is recommended by the manufacturer. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth. Under no circumstances shall pipes or fittings be forced into position, with or without heat.

#### 3.6 PLACING AND LAYING

Pipe and accessories shall be carefully lowered into the utilidor by means of derrick, ropes, belt slings, or other authorized equipment. Under no circumstances shall any of the waterline materials be dropped or dumped into the utilidor. Care shall be taken to avoid abrasion of the pipe coating. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no water, earth or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. Pipe ends left for future connections shall be valved, plugged or capped, and anchored, as shown.

##### 3.6.1 Connections

Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. Standard methods are available for making connections to various types of pipe, either under pressure or in the dewatered condition. Where made under pressure, these connections shall be installed as required by the Contracting Officer.

#### 3.7 JOINTING

Unrestrained sleeve type couplings shall not be used on fire lines.

##### 3.7.1 Ductile-Iron Pipe

Split sleeve joints shall be installed in accordance with AWWA C606 for cut grooved and shouldered pipe. Mechanical and restrained push-on joints

shall be installed in accordance with the applicable portions of AWWA C600.

### 3.7.2 Steel Pipe, Not Galvanized

#### 3.7.2.1 Mechanical Couplings

Mechanical couplings shall be installed in accordance with the recommendations of the couplings manufacturer.

#### 3.7.2.2 Rubber Gaskets

Rubber gaskets shall be handled, lubricated where necessary, and installed in accordance with the recommendations of the pipe manufacturer.

#### 3.7.2.3 Welding

Welding shall be in accordance with SECTION 05093 WELDING PRESSURE PIPING.

### 3.7.3 Galvanized-Steel Pipe

#### 3.7.3.1 Screw Joints

Screw joints shall be made tight with a stiff mixture of graphite and oil, inert filler and oil, or with an equivalent graphite compound, applied with a brush to the male threads only. Compounds shall not contain lead. Unions shall be provided where required for disconnection of piping.

#### 3.7.3.2 Welding

Welding shall be in accordance with SECTION 05093 WELDING PRESSURE PIPING. Exterior welded surface shall be finished with galvanized coating.

### 3.7.4 Copper Tube

Joints for copper tubing shall be made with soldered or brazed fittings. Tube shall be cut square with burrs removed. Outside surface of the tube where engaged in the fitting, and inside surface of the fitting in contact with the tube, shall be cleaned with an abrasive material before soldering. Care shall be taken to prevent annealing of tube and fittings when making connections. Solder joints shall be made with flux and wire form or paste-type solder. The flux shall be mildly corrosive liquid or petroleum-based paste containing chlorides of zinc and ammonium. Core solder shall not be used. Joints in copper tube 2-1/2 inches and larger shall be made with heat applied uniformly around the entire circumference of the tube and fittings by a multiflame torch. Joint material shall be 95/5 solder. 95/5 indicates 95 percent tin - 5 percent antimony solder in accordance with ASTM B 32.

### 3.7.5 Isolation Joints

Isolation joints shall be installed in accordance with details specified in paragraph ISOLATION JOINTS.

### 3.7.6 Transition Fittings

Connections between different types of pipe and accessories shall be made with transition fittings as required.

### 3.8 INSTALLATION OF SERVICE LINES

Services lines shall include the pipeline connecting water distribution lines to the connections with the building service as shown on the drawings. Where building services are not installed, the Contractor shall terminate the service lines inside the appropriate manhole on the main utilidor. Such service lines shall be closed with plugs or caps. Service lines shall be connected to the main by a rigid connection and shall have a gate valve.

### 3.9 FIELD COATING AND LINING OF PIPE

#### 3.9.1 Pipe 3 Inches and Larger

##### 3.9.1.1 Cement-Mortar Coating and Lining

Field jointing shall conform to Appendix, AWWA C205. Any welded pipe and defective area found in the coating and/or lining of pipe and joints shall be removed to the pipe wall, and the area shall be repaired in a manner such that the repaired areas will be at least equal in thickness to the minimum coating and/or lining required for the pipe. Steel reinforcement in the coating shall be repaired or replaced as necessary to assure a complete and soundly reinforced coating.

##### 3.9.1.2 Galvanized-Steel Pipe

Field joints shall be given one coat of coal-tar primer and two coats of coal-tar enamel conforming to AWWA C203, and any flaws or holidays found in the coating of pipe and joints shall be repaired by patching or other approved means; the repaired areas shall be at least equal in thickness to the minimum coating required for the pipe.

### 3.10 SETTING OF FIRE HYDRANTS

#### 3.10.1 Fire Hydrants

Fire hydrants shall be located and installed as shown. Each hydrant shall be connected to the main with a 6 inch branch line. This branch shall contain one gate valve. Hydrants shall be set plumb with pumper nozzle facing the roadway and with the center of the lowest outlet not less than 18 inches above the top of concrete lid and the operating nut not more than 48 inches above the top of concrete lid.

#### 3.10.2 Hydrants, After Delivery

Hydrants, after delivery, shall be drained to prevent freezing and shall have the interior cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and the hydrant shall be fully opened and fully closed to insure that all parts are in working condition.

### 3.11 CHECK VALVES AND VACUUM AND AIR RELIEF VALVES

Check valves and vacuum and air relief valves shall be installed in manholes as shown.

### 3.12 TEES, CROSSES, AND WYES

Tees, crosses and wyes for future connections shall be installed as shown.

### 3.13 THRUST RESTRAINT

Plugs, caps, tees and bends on all waterlines 4 inches in diameter or larger, and on fire hydrants, shall be provided with concrete or structural steel thrust blocking, anchors or metal tie rods and clamps or lugs, as shown on the drawings. Valves shall be securely anchored or shall be provided with thrust blocking to prevent movement. Blocking shall be placed between solid surface and the hydrant, valve, or fitting to be anchored. Blocking shall be placed so that the fitting joints will be accessible for repair. The connection between the utilidor water or fire lines and the interior building water or sprinkler piping, and all bends, plugs and tees on fire protection lines, shall be installed and restrained against thrust in accordance with NFPA 24, and as shown on the drawings. Steel rods and clamps shall be protected by coating with asphalt varnish or by galvanized coating.

### 3.14 EXPANSION JOINTS

Expansion in water lines and fire lines shall be provided by cut grooved pipe type couplings or other pipe joints, which permit 1 inches minimum of pipe movement, except as indicated on the drawings. Expansion Joints shall be designed for a minimum working pressure of 150 psi. Installation shall be per manufacturer's installation instructions. The length of the piping section where the expansion joint is to be installed shall be adjusted for the temperature of the pipe at the time of installation. Flexible type couplings may be used if full expansion is accounted for. The Contractor shall submit a table showing, for each 10 degrees F above and below the design temperature of 70 degrees F, the amount the center-to-end dimension of the joint shall be decreased or increased per each 100 feet of pipe length in the run (joint at mid-length when temperature of pipe section is 55 degrees F).

#### 3.14.1 Cut Grooved Pipe Type Coupling Expansion Joints

Joints shall be flexible. Joints and nipples shall conform to applicable requirements of paragraphs FITTINGS AND SPECIALS. Expansion joints shall be installed as recommended by the manufacturer.

#### 3.14.2 Restrained Push-On Joints

Flexible joints shall be installed as recommended by the pipe manufacturer to allow for axial movement within the joint due to thermal expansion and contraction.

### 3.15 ALIGNMENT GUIDES

#### 3.15.1 General

Alignment Guides shall be cast-iron or steel and shall be so constructed that the axial movement of the pipe caused by thermal expansion will be guided in a straight line only and movement in any other direction will be adequately restrained. Pipe alignment guides shall be the cylinder type with a guide spider attached to the pipe. Pipe alignment guides using a slide plate shall not be acceptable. The anchor base shall be correctly designed, adequately supported, and properly aligned to prevent distortion and binding of the pipe in the guide. The upper half of the guiding cylinder must be removable. All types must be designed for a pipe movement of not less than 8 inches. Guides shall be securely anchored against pipe movement. In no case will pipe rollers, racks, or hangers be considered substitutes for guides. Alignment guides that are supported from the floor of manholes or utilidors shall have the bottom 12 inches protected with two coats of coal-tar coating.

### 3.16 ANCHORS

Pipe anchors in manholes and utilidors shall be of welded construction, designed by the Contractor and submitted for written approval to the Contracting Officer. Shop drawings indicating anchor locations and details of design, including calculations, shall be submitted for Government Approval. Shop drawing approval shall be received prior to placing any piping. The range of anticipated pipe temperatures, which shall be used to determine the design forces on waterline anchors, is from 10 degrees F to 100 degrees F. Pressures for calculating forces are as follows: Working Pressure of 150 psi and a test pressure of 200 psi. If expansion anchors are used in lieu of cast in place anchor bolts, an additional safety factor of 1.5 shall be used in sizing the anchor bolts. No supports, anchors, or stays shall be attached in places where they will injure the construction whether in installing or by the weight or expansion of the pipe. Coordination of all aspects of anchor placement shall be the Contractor's responsibility. All steel shapes shall conform to ASTM A 36/A 36M. Bolts and nuts shall conform to ASTM A 307 and ASTM A 563, as applicable. The type and class shall be the Contractor's option. For finishing, see SECTION 02560 UTILIDOR SYSTEM, paragraph PAINTING AND FINISHING. Additionally, any anchor that is supported from the manhole or utilidor bottom shall have the lower 6 inches of the anchor protected with two layers of coal-tar coating. Anchors shall be attached to pipes by welding.

### 3.17 INSULATION

#### 3.17.1 General Requirements

Cold water lines, including valves and fittings, throughout utilidors shall be covered with insulation. As a part of the installation, the insulation shall have the joints buttered with mastic in such a manner as to fill all insulation joints and to prevent any future passage of vapor to the cold water pipe after the assembly is complete. Special care shall be exercised to insure that joint sealer material does not drip on the utilidor floor or become smeared on the outer surface of the insulation or adjacent piping.



The insulation shall be adequately secured to the pipe with 3/4-inch lacquered steel or other rust-resistant type bands, placed not over 12 inches on centers. Protection sleeves shall be provided at each support to protect the insulation. Sleeves shall be made up from a 12 inch wide strip of 20 gauge galvanized sheet metal cut to provide a one inch minimum overlap. Sleeves shall be secured to the insulation by 2 bands located approximately 1-1/2 inches from each end of the sleeve. Bands shall be the same type as used to secure insulation to pipe.

#### 3.17.2 Insulation

Pipe insulation shall be extruded polystyrene, expanded polystyrene, polyurethane foam or closed cell polyisocyanurate foam.

Insulation shall be at least 1 inch thick. Application shall be as described in General Requirements except that a positive vapor barrier shall be provided on the outside surface of all insulation, except for elastomer foam rubber insulation, including that protected by an aluminum jacket. Joints or fittings requiring routing out of more than 1/4 inch of insulation to secure proper insulation fit shall be covered with oversize insulation of sufficient thickness to obtain a minimum thickness of 1 inch.

#### 3.17.3 Aluminum-Jacket

Aluminum-jacket shall be provided over insulation on cold water lines in the manholes and to a distance of 5 feet into the new utilidors including valves and fittings. Aluminum-jacket material shall be of the best grade suitable for service. Aluminum-jackets shall be not less than 0.016-inch thick and shall be secured with aluminum bands not less than 3/8-inch wide and not more than 8 inches apart. Jacket sections shall have 1 inch hem turned along one longitudinal edge and shall be applied with the hemmed edge over the unhemmed edge. The longitudinal and circumferential seams shall be lapped not less than 2 inches. Jackets on horizontal lines shall be installed so that the longitudinal seams are on the bottom side of the pipe with the seam of each jacket slightly offset from the seam of the adjacent jackets. The seams of jackets installed on vertical lines shall be slightly offset as on horizontal lines. The jackets on vertical lines and lines pitched from the horizontal shall be installed from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it. Special fitting jackets conforming to the above, with the exception of longitudinal lapping dimensions and location of seams, may be used for fittings, valves, and flanges. Jackets for fittings, valves, and flanges shall be properly overlapped and secured. Under no conditions shall the jacketing be allowed to become electrically coupled to the piping or be installed vapor tight.

#### 3.17.4 Nonmetallic Jacket

Nonmetallic jackets shall be of the AWJ (All Weather Jacket) type. Nonmetallic jacket shall consist of a 0.042 pounds per square foot fiberglass fabric impregnated with chlorosulfonated polyethylene (Hypalon) and a 0.0015-inch (1.5 mils) polyvinyl fluoride film (Tedlar) bonded to it.

Overall thickness of the composite shall be 0.01 inch and weigh approximately 0.073 pounds per square foot. Jacket may be either field or

factory applied to the insulation.

### 3.18 HYDROSTATIC TESTS

Where any section of a water line is provided with concrete thrust blocking for fittings or hydrants, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking unless otherwise approved. The method proposed for disposal of waste water from hydrostatic tests and disinfection shall be submitted to the Contracting Officer prior to performing hydrostatic tests. Contractor is responsible to meet ADEC requirements and to obtain permits for water discharge during hydrostatic testing and disinfection.

#### 3.18.1 Hydrostatic Test

After the pipe is laid, the joints completed, and the fire hydrants permanently installed, the newly laid piping or any valved section of water distribution, or water service piping, or fire line shall, unless otherwise specified, be subjected for 2 hours to a hydrostatic pressure test of 200 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, valves and hydrants shall be carefully examined during the test. No leakage will be allowed. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, valves, or hydrants discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory.

#### 3.18.2 Time for Making Test

Except for joint material setting or where concrete thrust blocking necessitates a 5-day delay, pipelines may be subjected to hydrostatic pressure, inspected, and tested at any time after the line is secured. Cement-mortar lined pipe may be filled with water as recommended by the manufacturer before being subjected to the hydrostatic test.

#### 3.18.3 Concurrent Hydrostatic Tests

The Contractor may elect to conduct the hydrostatic tests using the following procedures. Regardless of the sequence of tests employed, the results of hydrostatic tests and disinfection shall be satisfactory as specified. All replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the Government.

##### 3.18.3.1 Hydrostatic Tests and Disinfection

Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

### 3.19 DISINFECTION

Before acceptance of potable water operation, each unit of completed water and fire line shall be disinfected as prescribed by AWWA C651. Disinfection shall be repeated until tests indicate the absence of pollution for at least 2 full days. The unit will not be accepted until satisfactory results have been obtained from water samples submitted by the Contractor to a laboratory certified by the State of Alaska to perform testing for coliform bacteria.

### 3.20 CLEANUP

Upon completion of the installation of the water distribution lines and water service lines, fire lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --

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SECTION 02560

UTILIDOR SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	(2000) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 36	(2000a) Carbon Structural Steel
ASTM A 570/A 570M	(1998) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 780	(2000) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM B 633	(1998) Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C 578	(2003a) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 920	(2002) Elastomeric Joint Sealants
ASTM D 1777	(1996) Measuring Thickness of Textile Materials
ASTM D 41	(1984; R 2000) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 43	(2000) Coal Tar Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 449	(1989; R 1999) Asphalt Used in Dampproofing and Waterproofing
ASTM D 450	(1996; R 2000) Coal-Tar Pitch Used in Roofing, Dampproofing and Waterproofing

ASTM D 5034 (1995) Breaking Force and Elongation of  
Textile Fabrics (Grab Test)

ASTM D 751 (2000) Coated Fabrics

INTERNATIONAL CODE COUNCIL (ICC)

IBC 2000 International Building Code 2000

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS  
INDUSTRY (MSS)

MSS SP-58 (1993) Pipe Hangers and Supports -  
Materials, Design and Manufacture

MSS SP-69 (1996) Pipe Hangers and Supports -  
Selection and Application

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-60005 (1998) Frames, Covers, Gratings, Steps,  
Sump and Catch Basin, Manhole Castings

CID A-A-1632 (Basic) Varnish, Asphalt

FS TT-S-001543 (Rev. A) Sealing Compound: Silicone  
Rubber Base (For Calking, Sealing, and  
Glazing in Buildings and Other Structures)

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25 (1997) Oxide, Zinc Oxide, Raw Linseed Oil  
and Alkyd Primer (Without Lead or Chromate  
Pigments).

## 1.2 GENERAL REQUIREMENTS

### 1.2.1 Winter Heating Requirement

When the ambient air temperature is below 32 degrees F, the utilidor sections and manholes shall be heated. All temperatures shall be constantly and adequately monitored. The Contractor shall submit its heating and monitoring plan as detailed in paragraphs QUALITY PROVISIONS and SUBMITTALS. For the purposes of this paragraph, "backfilled" shall mean that insulation, if required, has been installed and backfill has been placed as directed by contract plans and specifications up to within 3 inches of the top of the structure's walls. This requirement shall apply to both new utilidors and manholes, and existing utilidors and manholes that have work under this contract.

- a. When the utilidor sections or manholes are insulated and backfilled, the structures shall be heated such that the minimum inside air temperature at all locations is 40 degrees F.

b. When the utilidor sections or manholes are not backfilled, the entire structure, to include air spaces and all external surfaces and unbackfilled trench areas within 3 lineal feet of the structure's walls, shall be heated to 40 degrees F minimum.

c. Any utilidor system not included in this contract but connected to utilidors having work under this contract shall be heated as described above. The extent of this heating shall include all areas that are disturbed under this contract. "Disturbed" shall include excavation or any other work that alters the thermal regime and exposes the utilidor and/or manholes to freezing temperatures.

#### 1.2.2 Nameplates

Each major item of equipment shall have the manufacturer's name, address, type or style, and model or serial number on a plate secured to the item of equipment.

#### 1.2.3 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

#### 1.2.4 Steam, Water, and Sewerage Facilities

All steam, water and sewerage facilities and all other work required to be installed in the completed utilidors as called for by the drawings or specifications shall be furnished and installed in accordance with the applicable provisions of other sections of these Specifications.

#### 1.2.5 Site Work

##### 1.2.5.1 Excavation, Trenching, Filling and Backfilling

Excavation, trenching, filling and backfilling shall be as hereinbefore specified in SECTION 02300 EARTHWORK of these specifications. The utilidors shall be constructed to the grades as required by the drawings.

##### 1.2.5.2 Relocation of Interferences

Interferences as indicated, or as found during construction, shall be removed or relocated as necessary. Relocations shall be as indicated or as approved by the Contracting Officer. Examples of interferences are:

- a. Power and Communication lines;
- b. Fences and sidewalks;
- c. Utilidors.



#### 1.2.5.3 Modifications to Existing Facilities

Modifications shall be made as indicated. Examples of modifications are:

- a. Removal and replacement of street or parking area pavements.
- b. Re-construction of existing manholes.
- c. New utility distribution piping entrances to buildings, manholes, or utilidors.

Any other modifications shall be made as required for complete installation of the utilidor system as indicated.

#### 1.2.6 Standard Products

The equipment to be furnished under this specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be the products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. The products of any reputable manufacturer regularly engaged in the commercial production of required equipment will not be excluded on the basis of minor differences, provided all essential requirements of this specification relative to materials, capacity and performance are met.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with SECTION 01330 SUBMITTAL PROCEDURES:

##### SD-01 Preconstruction Submittals

Heating and Temperature Monitoring Plan

##### SD-02 Shop Drawings

Detail Drawings; G, EN-TE-CS

Fabrication and Erection Drawings

##### SD-03 Product Data

Schedules of Work and Tests Required for Installation

Manufacturer's Catalog Data

##### SD-04 Samples

Materials

SD-05 Design Data

Steel Strut Pipe Support System Design Calculations

Seismic Bracing Calculations

SD-08 Manufacturer's Instructions

Waterproofing Material

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

1.4 SUBMITTALS SUPPLEMENT

See paragraphs below for further descriptions (when available) of submittals required by paragraph SUBMITTALS:

1.4.1 Detail Drawings

Fabrication and assembly drawings of work in sufficient detail to verify compliance with the contract for the following:

- a. Sump Pumps
- b. Precast or Site-Cast Concrete Utilidor Lids
- c. Manholes to include Sumps and Vents
- d. Utilidor Construction
- e. Alarm Lights and posts
- f. Catwalks
- g. Manhole expansion and reconstruction
- h. Steel pipe support, seismic bracing, and anchorage system
- i. Temporary and permanent cut-off walls.
- h. Details of piping and fitting transitions between awarded options and existing piping to remain

1.4.2 Fabrication and Erection Drawings

At least 30 days prior to casting any units, the Contractor shall submit complete fabrication and erection drawings and placement diagrams, and shall submit such other descriptive data as the Contracting Officer may require to demonstrate compliance with the contract requirements. The submittal shall also include the Contractor's proposed methods of curing and storing the units in the casting yard and complete details of its method of casting, handling, transporting, and erecting the units,

including type and location of lifting devices. Fabrication and erection drawings shall contain plans showing the size and location of every blockout required for any opening in each unit. Openings include those necessary for mechanical or electrical work, or any other major physical interference. Fabrication and erection drawings shall include drawings showing placement of pipe supports, seismic bracing, alignment guides and anchors for manholes and utilidor sections. Fabrication and erection drawings and placement diagrams for all units shall be submitted at one time. No casting operations shall commence at a permanent or temporary on- or off-site fabrication plant until fabrication and erection drawings and placement diagrams have been received by the Contracting Officer.

1.4.3 Schedules of Work and Tests Required for Installation

1.4.4 Manufacturer's Catalog Data

Catalog cuts, brochures, and product data verifying compliance with the contract for the following:

- a. Insulation adhesive.
- b. Insulation material.
- c. Sealants

1.4.5 Materials

Representative samples in the following quantities:

- a. Urethane Membrane: 1 gallon
- b. Construction Fabric: 1 square yard

1.4.6 Waterproofing Material

Manufacturer's installation instructions and certificate of compliance shall be submitted before delivery of materials to the site. For bitumen, instructions shall specify acceptable range of bitumen application temperatures and the maximum temperature for holding bitumen in a heated condition.

1.4.7 Operation and Maintenance Manuals

Provide 4 sets of O + M Manuals 1 set shall be on compact disc.

1.5 CONCRETE WORK

1.5.1 Concrete

Concrete shall be as specified in SECTION 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

## 1.6 PIPE INSERTS, ANCHORS AND SUPPORTS

Pipe inserts, anchors and supports for all systems shall be as specified in SECTION 02511 WATER DISTRIBUTION SYSTEMS IN UTILIDORS except that those for the steam system are specified in SECTION 02559 HEAT DISTRIBUTION SYSTEMS IN UTILIDORS AND MANHOLES. The steel strut support system for the piping shown in the plans is generic only. The Contractor shall submit design calculations and shop drawings for the steel strut system and seismic bracing system. Sewer pipe supports must be designed so that the elevation of the pipe can be adjusted at each support point to compensate for seismic movement and settling in the future. Calculations shall be stamped and signed by an engineer registered in the State of Alaska.

### 1.6.1 Pipe Seismic Bracing

The Contractor shall design the pipe seismic bracing in accordance with IBC 2000. Resistance to lateral forces induced by earthquakes shall be accomplished without consideration of friction resulting from gravity loads. Bracing for the following equipment shall be developed by the Contractor: All of the utilidor piping and appurtenances and the steel strut pipe support system.

## PART 2 PRODUCTS

### 2.1 COATINGS AND SEALANTS

#### 2.1.1 Coal Tar Coating

The coal tar coating shall be a self-priming, heavy duty, cold-applied, water resistant coating made from pitch derived from suitable tars, selected solvents, mineral fillers and special additives. The material shall be able to protect against the deteriorating effects of raw and industrial waste materials and hydrogen sulfide gas, and be suitable for application to all metal, concrete and board insulation surfaces which will be buried, immersed, or exposed. The coating shall be applied in accordance with the manufacturer's recommendations to include, but not limited to, priming and top coats. The coal tar coating shall be Bitumastic Super Service Black as manufactured by Carboline Company, or equal. Sealastic No. 2 emulsion may be substituted and applied in accordance with manufacturer's recommendation.

#### 2.1.2 Asphalt Varnish

Asphalt varnish shall conform to Federal Specification CID A-A-1632.

#### 2.1.3 Utilidor Lid Seal

Surfaces of joints to be in contact with mastic shall be dry and free of oil, grease, dirt, loose concrete particles, or other foreign substances. Trowel on a generous layer of "Fibered Roof Coating", ATCO product #1818 or approved equal. Lay two runs of "Oakum" type filler material or 5/8 inch plastic closed cell backer rod on top of wall, into the mastic as shown on the drawings. All lifting loops, hooks, or eyes shall be nondeformed, ASTM A 36 galvanized steel unless a stronger steel or superior finish is shown

on the drawings.

#### 2.1.4 Sealant

Sealant for pipe sleeves shall conform to Federal Specification FS TT-S-001543. Sealant for utilidor shall conform to ASTM C 920, Type II, Class A. The compound shall be supplied in pre-measured kit form for on-the-job mixing.

##### 2.1.4.1 Primer

Primer for sealant shall be as recommended by the sealant manufacturer. Primer shall have been tested for durability with the sealant to be used and on samples of the surfaces to be sealed.

##### 2.1.4.2 Backstop Material

Backstop materials shall be resilient urethane or polyvinyl chloride foam, closed-cell polyethylene foam, closed-cell sponge of vinyl or rubber, polychloroprene tubes or beads, polyisobutylene extrusions, oilless dry jute, or rope yarn. Backstop material shall be nonabsorbent, nonstaining, and compatible with the sealant used. Tube or rod stock shall be rolled into the joint cavity.

##### 2.1.5 Zinc Oxide Primer

Zinc oxide primer shall conform to SSPC Paint 25.

##### 2.1.6 Galvanized Coating

Repair shall conform to ASTM A 780 for damaged and uncoated areas of hot-dip galvanized coating.

#### 2.2 INSULATION

##### 2.2.1 Extruded Polystyrene

Extruded polystyrene shall conform to ASTM C 578, Type IV. Exterior insulation for utilidors with traffic lids shall have the added requirement of 60 psi minimum compressive strength.

#### 2.3 WATERPROOFING

##### 2.3.1 Asphalt

ASTM D 449, Type II.

##### 2.3.2 Coal-Tar

ASTM D 450, Type II.

##### 2.3.3 Primer

ASTM D 41 for asphalt and ASTM D 43 for coal-tar pitch.

## 2.4 CONSTRUCTION FABRIC

Construction fabric shall meet the following requirements:

<u>PROPERTY</u>	<u>DATA</u>	<u>TEST METHOD</u>
Thickness, mils, min.	100	ASTM D 1777
Mullen Burst Strength, psi, min.	400	ASTM D 751 Diaphragm Method
Trapezoidal Tear Strength, lbs., min.	90	ASTM D 751
Puncture Resistance, lbs., min.	120	ASTM D 751
Elongation at 250 lb. Load, percent, max.	150	ASTM D 5034

## 2.5 STEEL AND MISCELLANEOUS METAL

Steel and miscellaneous metal not otherwise specified shall conform to SECTION 05500, MISCELLANEOUS METALS.

## 2.6 SUPPORT RACK AND INSERT SYSTEM

Steel strut system supports shall be manufactured from ASTM A 570/A 570M, Grade 33, 12 gauge hot dipped galvanized steel in accordance with ASTM A 123. System shall be rated for a minimum 1500 lb point loading. To inhibit concrete seepage in concrete inserts system shall include closure and end caps or foam filler. Strut system shall be coordinated with and accommodate pipe rollers as specified. Supports and anchors in utilidors and manholes that rest on the utilidor or manhole bottom shall be protected with two coats of coal-tar coating or equal applied to a minimum of the lower 12 inches of the support. Scratches and chips in the coating acquired during transport or installation shall be re-coated.

### 2.6.1 Pipe Rollers

Pipe rollers shall conform to MSS SP-58 and MSS SP-69 type 41, 44 or 46. Pipe rollers shall be one-piece cast iron type rollers. Split two-piece and aluminum rollers shall not be allowed. Teflon slide plate type supports shall not be allowed.

## PART 3 EXECUTION

### 3.1 MANHOLES AND ACCESSORIES

#### 3.1.1 General

New manholes shall be field constructed, reinforced concrete type. Existing manholes shall be modified as shown on the drawings. Where connections to existing utilidors or manholes are required, the Contractor

shall break open the utilidor or manhole to the minimum extent necessary for adequate tying of the new construction to the old. All steel bars shall be thoroughly cleaned before placing any concrete. Before any new concrete is placed against the old concrete, the surface of the latter shall be cleaned of all debris and loose material and a coating of neat cement grout applied just prior to placing the new concrete. No structures and/or appurtenances shall be supported from manhole tops other than the access ladder, electrical hardware, and any structure specifically shown on the drawings as being supported from the manhole tops.

### 3.1.2 Manhole Construction and Accessories

The manholes shall be constructed of reinforced concrete. Manhole side walls shall be constructed by one monolithic pour.

#### 3.1.2.1 Dimensions

Manhole dimensions shall be as indicated and in all cases shall provide sufficient room for maintenance equal to or greater than the pipe spacing shown in the drawings. Manhole sumps shall be 2 feet deep by 2 feet in diameter unless shown otherwise. At the Contractor's option, the sump may be a 2 feet deep by 2 feet square. At the Contractor's option, the sump may be a Schedule 40 steel pipe, 26 inches in diameter. The pipe shall be closed at the bottom by either a 0.5 inch steel plate or a 4 inch thick, reinforced concrete base. The pipe shall be locked into manhole floor and PCC base. The finished depth of the sump shall be 2 feet. The pipe sump shall be coated with a coal tar coating.

#### 3.1.2.2 ~~AM#2...~~Deleted...~~AM#2~~

#### 3.1.2.3 Fire Hydrant Manhole Frames and Covers

Frames and covers shall be of the solid lid type and conform to the applicable portions of Federal Specification FS A-A-60005. Frames and covers shall:

- a. Have a minimum masonry contact of 3 inches overlap.
- b. Be constructed of ductile iron or gray iron.
- c. Have a clear access of 24 inches or as indicated on the drawings.
- d. Have hatches covered with one round lid.
- e. Have external (non-recessed) butt-type hinges securely attached to the frame that shall not work loose under repeated opening and closing of the lids.
- f. Have fixed protruding handle with a minimum clear hand opening of 5 inches by 2 1/2 inches.

Frames and covers shall be proof-load tested in accordance with Federal Specification FS A-A-60005. Loading shall be for 1,000 pounds. Frames and covers shall be R-6320-E as manufactured by Neenah Foundry Company of

Neenah, WI, as modified above, or equal.

#### 3.1.2.4 Manhole Doors

Door Lids with frames shall be Aluminum "Bilco Type J-AL or JD-AL" vault doors or approved equal, dimensioned as shown on drawings. The vault access shall be single leaf, pre-assembled from the manufacturer. Doors shall fit into the existing access hatch and shall be fastened with 3/8 inch expansion anchors drilled and fastened into existing frame and concrete.

a. Lifting mechanisms: Doors shall have the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy and controlled cover operation through the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly.

b. A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover and the latch release protected by a flush, gasketed, removable screw plug.

c. Cover shall be equipped with a steel hold open arm which automatically locks the cover in the open position.

d. Compression spring tubes shall be an anti-corrosive composite material, hinges and steel snap lock shall be Type 316 stainless steel.

#### 3.1.2.5 Manhole Vents

Manholes shall be provided with two natural convection style vents located at opposite corners. Vents shall be constructed of minimum 8-inch diameter, Schedule 40 galvanized pipe, capped and rise a minimum 36" above exterior finished grade. One vent shall draw from approximately 6 inches below manhole ceiling and the other from 12 inches above manhole floor. Vents shall be provided with a manual damper located inside the manhole. The vent pipe shall be painted in accordance with SECTION 09900 PAINTS AND COATINGS, additionally, the buried portion of the pipe shall be also be coated with coal-tar coating or equal.

### 3.2 CONCRETE UTILIDOR SYSTEM

#### 3.2.1 General

A concrete utilidor system shall be provided and installed with removable lids as shown in detail on the drawings. Lids for utilidors in general shall be precast. The walls and floor slabs shall be either monolithic construction, placed with construction joints between bottom and sides or placed with construction joints between sides and a starter wall cast into the bottom. No structures and/or appurtenances shall be supported from the utilidor lids.



### 3.2.2 Concrete Utilidor Lids

Concrete utilidor lids shall be flat and true at all locations where contact on utilidor wall is to be made. Concrete utilidor lids with defects which affect the strength of the cover unit, or which are warped, honeycombed, contain visible air pockets, exposed aggregate or other surface defects such as spalled, chipped or broken edges shall not be installed. Handling and conveying before curing shall be reduced to a minimum by use of methods designed to prevent bending or shock likely to produce incipient cracks or other deformities. All lifting loops or eyes shall be nondeformed, ASTM A 36 galvanized steel unless a stronger steel or superior finish is shown on the drawings.

The joint where the sides of the utilidor top meets the utilidor lid shall be thoroughly cleaned, dry, free of oil, grease, dirt, loose concrete particles, or other foreign substances. Trowel on a (approximately 1/4" high by 4" wide) layer of "fibered Roof Coating", ATCO product #1818, or equal. Lay two runs of "Oakum" type filler or 5/8" closed cell backer rod material on top of wall, into the mastic.

### 3.2.3 Concrete Utilidor Construction

The concrete utilidor system shall be of various sizes to accommodate the different piping arrangements as indicated. The concrete utilidor wall top dimensions are critical to provide a tight fitting system. Contractor shall use extreme caution when forming and placing inside edge and top of walls to provide smooth even surfaces to accommodate utilidor lids.

### 3.2.4 Final Elevations

The concrete utilidor floor shall slope continuously and drain toward manholes. The Contractor shall set the concrete utilidor at the elevation shown on the drawings and shall grade the adjacent areas. Any cut or fill areas adjacent to the concrete utilidor shall be graded back to the existing grade at a 2 percent slope or as indicated. There shall be no surface depressions which might prevent free surface drainage away from the utilidor. Final elevations shall be approved by the Contracting Officer. Once the final elevation is set, the concrete utilidor floor and piping must maintain constant slope to drain toward a manhole.

### 3.2.5 Coordination With Existing Utilities

Before beginning work in a given area, the Contractor shall become familiar with all known utility locations shown and expose those existing underground utilities to verify existing conditions to determine any conflicts with the work, and to plan his work accordingly. The actual concrete utilidor routing may be offset or changed if approved by the Contracting Officer in order to reduce conflicts, interruptions, expedite the work, or for any other reason to the mutual benefit of the Contractor and the Government.

## 3.3 PIPE SLEEVE REQUIREMENTS

Pipes and conduits passing through concrete walls, floors, or tops shall be

provided with pipe sleeves fitted into place at the time of construction. The space between the pipe and sleeve shall be filled with back-up material and sealed flush with both inside and outside surfaces with a 3/8-inch deep bead of sealant. Sleeves shall not be installed in structural members, except where indicated or approved. Each sleeve shall extend through its respective wall, floor or top, and shall be cut flush with each surface, except for special circumstances. Unless otherwise indicated, sleeves shall be of size to provide a minimum of 1/4-inch clearance all-around between bare pipe and inside of sleeve or between jacket over insulation and sleeves. Sleeves shall be steel pipe, cast-iron pipe, or ductile iron pipe.

### 3.4 PIPE SUPPORT RACK

Pipe racks in utilidors shall be 1-5/8 inch wide continuous slotted channels (Unistrut, or equal), metal framing systems, using nut and bolt connections of fittings and hardware to the slotted channels. In new concrete construction, the wall supports shall be embedded in concrete. Pipe racks and support systems for sewer pipe shall be vertically adjustable in 1/2-inch increments up to 4 inches in each direction to allow elevation adjustments in the event of future settlement. The Contractor shall provide pipe rack configurations as necessary throughout the project, and shall include, in his shop drawing submittal, drawings with dimensions showing clearances from support members to piping systems, pipe rack dimensions, maintenance access aisle, components and fittings proposed for use. Bottom of supports shall not rest in drainage trench in utilidor bottom. Pipe support systems may not be suspended from removable utilidor or manhole lids.

### 3.5 WATERPROOFING

The below ground exterior of all concrete manhole and utilidor side and lids (top and side of new and existing lids) shall be waterproofed in accordance with this paragraph. Waterproofing shall extend a minimum of 2 feet beyond construction joints with existing utilidor and manholes. Waterproof all existing and new below ground manhole exposed in the course of constructing new access shafts, ceilings, and expanding existing manhole chambers. The utilidor walls exposed in the course of removing lids to access utilidor piping and all new utilidor shall also be waterproofed as described in this paragraph.

#### 3.5.1 Delivery and Storage

Materials shall be delivered to the job site in their original unopened packages, clearly marked with the manufacturer's name, brand name, and description of contents. Materials shall be stored in clean, dry areas, away from excessive heat, sparks, and open flame. Storage area shall be ventilated to prevent build-up of flammable gases. Materials shall be maintained at not less than 50 degrees F for at least 24 hours before use.

#### 3.5.2 Preparation

Preparation of surfaces to be waterproofed shall be as specified in SECTION 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Items that penetrate the membrane

shall be installed before waterproofing is applied. Surfaces shall be smooth and swept thoroughly to remove foreign materials immediately before waterproofing is applied.

### 3.5.3 Waterproofing

Waterproofing shall consist of the appropriate number of coatings of either bitumen or urethane membrane as specified herein.

#### 3.5.3.1 Bituminous Waterproofing

a. Application: Waterproofing shall not be applied if frothing or bubbling occurs when hot bitumen is applied to the surface. The hot bitumen must stick tightly to the surface. When waterproofing in an enclosed space, adequate ventilation shall be provided. Waterproofing shall be one layer of primer and one layer of asphalt or coal-tar, applied in solid moppings. Waterproofing shall be applied when the ambient temperature is 40 degrees F or above. Asphalt shall not be heated above 450 degrees F nor coal tar above 375 degrees F. Heating kettles and tanks shall be provided with automatic thermostatic control capable of maintaining bitumen temperature. Temperature of bitumen at time of application shall be in accordance with the bitumen manufacturer's recommendation. Temperature shall be measured with portable thermometer at the point of application immediately before its use. Bitumen with a temperature not conforming to the manufacturer's recommendations shall be returned to the kettle. Bitumen overheated by more than 50 degrees F for more than 1 hour shall be removed from the site. Sealastic No. 2 emulsion may be substituted and applied in accordance with manufacturer's recommendation.

b. Priming: Surfaces shall be coated uniformly with primer at the rate recommended by the manufacturer.

c. Projections and Flashing: All pipes, pipe sleeves, and other similar projections through the membrane shall be made watertight, and all flashings and similar construction shall be mopped thoroughly in place.

d. Coating: Coating shall be applied uniformly at the rate of not less than 60 pounds of asphalt or 70 pounds of coal-tar per square. Sealastic No. 2 emulsion shall be applied in accordance with manufacturer's recommendation. Brooms shall have soft bristles and shall be discarded when bitumen buildup on the fibers prevents application of equal pressure across the broom width.

e. Protection: Waterproofing against which backfill is to be placed shall be protected by a single thickness of insulation board, unless insulated with polystyrene or cellular glass in accordance with other sections of this specification. The insulation board shall be pressed into the final mopping while the bitumen is still hot, with edges of boards brought into moderate contact and joints staggered. Where surfaced insulation board is used, the surfaced side shall face outward. Boards shall be carefully and neatly fitted around projections and shall cover the entire surface of the waterproofing.

Waterproofing not covered with insulation fiberboards shall be protected as necessary to prevent damage from subsequent building operations.

#### 3.5.3.2 Urethane Industrial Membrane System

Installation shall comply with the manufacturer's instructions, except as otherwise specified. The membrane shall bond to concrete. Application shall be in two coats minimum with successive coats applied at right angles to the preceeding coat. Finished thickness of the membrane shall be 40 mils, minimum.

a. Projections and Flashings: All pipes, pipe sleeves, and other similar projections through the membrane shall be made watertight, and all flashings and similar construction shall be secured thoroughly in place.

b. Protection: Waterproofing against which backfill is to be placed shall be protected by a single layer of construction fabric. Construction fabric shall be carefully and neatly fitted around projections and shall cover the entire surface of the waterproofing.

#### 3.5.3 Equipment Calibration (For Two-Component Systems Only)

Spray equipment for two-component systems shall be calibrated each day at start of operations, after each restart if spraying operations have been terminated for more than 1 hour, wherever there is a change in fan pattern or pressure, whenever slow curing areas are noticed, whenever a change is made in hose length or working height and after changeover between materials. Calibration shall consist of demonstrating that the equipment is adjusted to deliver components in the proper proportions. Calibration tests shall be done on the utilidor section adjacent to the area to be sprayed.

### 3.6 PAINTING AND FINISHING

#### 3.6.1 Ferrous Metal Surfaces Inside Utilidors and Manholes

All ferrous metal surfaces in utilidors and manholes, excluding piping, but including racks, supports, hangers, and covers, shall be treated by the following method unless specifically directed otherwise in the project specifications:

Items shall be galvanized coated with ASTM B 633, Type I, Class Fe/Zn 25; or ASTM A 153, Class A.

Racks, hangers, and support system shall be galvanized by the following method.

All pipe hangers and supports shall be hot-dip galvanized after fabrication to provide a Coating Grade of 65 (average zinc coating of 1.5 ounces/square foot) in accordance with ASTM A 123.

Ladders shall be galvanized.

Axles for pipe rollers shall be galvanized.

If surfaces have been shop-coated, the shop coat shall be thoroughly cleaned and touched-up at corroded, scarred, abraded surfaces, cut edges, exposed threads, or welded areas as follows: areas shall be given two coats (minimum) of cold galvanizing compound in accordance with manufacturer's recommendations.

The following items are not required to be treated. These items may be provided as black steel with no galvanized coating.

Roller supports.

Protection saddles.

### 3.6.2 Ferrous Metal Surfaces Outside Manholes

All ferrous metal surfaces outside manholes shall be painted in accordance with SECTION 09900 PAINTS AND COATINGS. Buried sections of air vent pipes shall be coated with coal tar coating, exposed portions shall be painted.

### 3.7 INSULATION

The utilidors and manholes shall be insulated as shown and as hereinafter specified. Insulation shall be kept dry at all times and protected from weather and moisture before and after installation. Polystyrene insulation shall not be left exposed to direct sunlight for a combined period greater than 24 hours.

#### 3.7.1 Requirements

The surfaces to be insulated shall be covered with extruded polystyrene. Exterior insulation for utilidors with traffic lids shall have the added requirement of 60 psi minimum compressive strength.

#### 3.7.2 Installation of Insulation

##### 3.7.2.1 Exterior Surfaces

Insulation shall be attached to exterior surfaces with an adhesive as recommended by the insulation manufacturer. If bituminous waterproofing is used, it shall be still hot during insulation installation.

a. Finish: Joints between blocks shall be buttered with insulation manufacturer's recommended mastic compatible with the waterproofing material, and blocks shall be butted snugly together. The insulation shall be protected during backfill operations to prevent any damage. Damaged insulation shall be replaced at no cost to the Government.

b. Openings: Openings in insulation around lifting loops, vents, and other protrusions shall be filled and cemented flush with the face of the insulation, with mastic as specified above.

### 3.8 QUALITY PROVISIONS

#### 3.8.1 General

Tests shall be conducted before, during and after the installation of the system. All instruments, equipment, facilities, and labor required to properly conduct the tests shall be provided by the Contractor.

#### 3.8.2 Field Tests

The following field test shall be conducted when applicable to the system involved. If any failures occur, the Contractor shall make adjustments or replacements as the Contracting Officer may direct, and the tests shall be repeated until satisfactory installation and operation are achieved.

##### 3.8.2.1 Equipment

All pumps, alarms, controls, and any other operable items of equipment shall be operated to verify proper operation and compliance with the specifications.

#### 3.8.3 Heating and Temperature Monitoring Plan

The Contractor shall submit his plan for heating and temperature monitoring for the utilidor system. This plan shall include, but not be limited to: heater types and locations, monitor types and locations, inspection schedule, and contingency plan.

### 3.9 CLEANING OF UTILIDOR SYSTEM

After tests are completed, and before utilidor covers are placed, the utilidors, sumps, and manholes shall be broom-cleaned of dirt and debris to the satisfaction of the Contracting Officer. Utilidor lids shall be placed and sealed immediately after approval by the Contracting Officer.

-- End of Section --

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SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100Doc (2001) Documentation of the Threshold  
Limit Values and Biological Exposure  
Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A13.1 (1996; R 2002) Scheme for Identification  
of Piping Systems

ASTM INTERNATIONAL (ASTM)

ASTM D 2092 (1995; R 2001e1) Preparation of  
Zinc-Coated (Galvanized) Steel Surfaces  
for Painting

ASTM D 523 (1989; R 1999) Specular Gloss

MASTER PAINTERS INSTITUTE (MPI)

MPI 101 (Jan 2004) Epoxy Anti-Corrosive Metal  
Primer

MPI 108 (Jan 2004) High Build Epoxy Coating, Low  
Gloss

MPI 110 (Jan 2004) Water Based Light Industrial  
Coating, G6, G5, G3

MPI 134 (Jan 2004) Galvanized Primer (Waterbased)

MPI 21 (Jan 2004) Heat Resistant Enamel, Gloss  
(up to 205 degrees C and 400 degrees F),  
MPI Gloss Level 6

MPI 23 (Jan 2004) Surface Tolerant Metal Primer

MPI 49 (Jan 2004) Interior Alkyd, Flat, MPI Gloss

Level 1

MPI 79	(Jan 2004) Alkyd Anti-Corrosive Metal Primer
MPI 94	(Jan 2004) Exterior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 95	(Jan 2004) Quick Drying Primer for Aluminum

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP01-01	(2000) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints
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THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 3	(1982; R 1995) A Guide to Safety in Paint Application
SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC SP 1	(1982; R 2000) Solvent Cleaning
SSPC SP 10	(2000) Near-White Blast Cleaning
SSPC SP 12	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 2	(1982; R 2000) Hand Tool Cleaning
SSPC SP 3	(1982; R 2000) Power Tool Cleaning
SSPC SP 6	(2000) Commercial Blast Cleaning
SSPC SP 7	(2000) Brush-Off Blast Cleaning
SSPC VIS 1	(2002) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(1993) Visual Standard for Power-and Hand-Tool Cleaned Steel
SSPC VIS 4	(2001) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements
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U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313 (Rev D; Am 1) Material Safety Data,  
Transportation Data and Disposal Data for  
Hazardous Materials Furnished to  
Government Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000 Air Contaminants

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Submit color stencil codes

SD-03 Product Data

Coating

Manufacturer's Technical Data Sheets

SD-04 Samples

Color; G

Submit manufacturer's samples of paint colors. Cross reference

color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings G

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

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1.3.1 **AM#2...Deleted...AM#2**

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality

Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

#### 1.5 REGULATORY REQUIREMENTS

##### 1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

##### 1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

##### 1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

##### 1.5.4 Asbestos Content

Materials shall not contain asbestos.

##### 1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

##### 1.5.6 Silica

Abrasive blast media shall not contain free crystalline silica.

##### 1.5.7 Human Carcinogens

Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human

carcinogens (A1) or suspected human carcinogens (A2).

#### 1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F.

#### 1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

##### 1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC Guide 3.

##### 1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
- b. 29 CFR 1910.1000.
- c. ACGIH 0100Doc, threshold limit values.

#### 1.8 ENVIRONMENTAL CONDITIONS

##### 1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than 5 degrees F above dew point;
- b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product

manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

#### 1.9 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

#### 1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

##### 1.10.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

##### 1.10.1.1 Exterior Painting

Includes new surfaces of the appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

##### 1.10.1.2 Interior Painting

Includes new surfaces of the appurtenances as indicated and existing coated surfaces made bare by cleaning operations.

##### 1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

- a. Steel to be embedded in concrete.
- b. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- c. Hardware, fittings, and other factory finished items.

#### 1.10.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces.

- a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

- (1) Exposed piping;

- b. Do not paint the following, unless indicated otherwise:

- (1) New zinc-coated, aluminum, and copper surfaces under insulation

- (2) New aluminum jacket on piping

- (3) New interior ferrous piping under insulation.

#### 1.10.4 Exterior Painting of Site Work Items

Field coat the following items:

##### New Surfaces

- a. Aboveground vent Piping.
- b. The heat affected zone of field welded galvanized surfaces and other galvanized surfaces damaged during installation.
- c. Electrical equipment not otherwise specified and finish painting of items only primed at the factory.

#### 1.10.5 Definitions and Abbreviations

##### 1.10.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

##### 1.10.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

##### 1.10.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.).



They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.5.7 EXT

MPI short term designation for an exterior coating system.

1.10.5.8 INT

MPI short term designation for an interior coating system.

1.10.5.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.10.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.10.5.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.10.5.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

#### 1.10.5.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

#### 1.10.5.14 Paint

See Coating definition.

#### 1.10.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

#### 1.10.5.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

### PART 3 EXECUTION

#### 3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to

be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

### 3.2 SURFACE PREPARATION

Remove dirt, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

### 3.3 PREPARATION OF METAL SURFACES

#### 3.3.1 Existing and New Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, or SSPC SP 3. Brush-off blast remaining surface in accordance with SSPC SP 7. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/SSPC SP 12 WJ-3.

#### 3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

#### 3.3.3 Galvanized Surfaces

- a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the

galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

- b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.
- c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Spot abrasive blast rusted areas as described for steel in SSPC SP 6, and waterjet to SSPC SP 12, WJ3 to remove existing coating.

#### 3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

- a. Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

### 3.4 APPLICATION

#### 3.4.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish.

Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

- a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
- b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
- c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

#### 3.4.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

#### 3.4.3 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

##### Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the

minimum dry film thickness.

- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
  - (1) One coat of primer.
  - (2) One coat of undercoat or intermediate coat.
  - (3) One topcoat to match adjacent surfaces.

### 3.5 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

### 3.6 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with ANSI A13.1. Place stenciling in clearly visible locations.

On piping not covered by ANSI A13.1, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

### 3.7 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

### 3.8 PAINT TABLES

All DFT's are minimum values.

#### 3.8.1 EXTERIOR PAINT TABLES

##### DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

##### STEEL / FERROUS SURFACES

#### A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

##### 1. Alkyd

New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
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MPI 23	MPI 94	MPI 94
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System DFT: 5.25 mils

#### B. New Steel that has been blast-cleaned to SSPC SP 6:

##### 2. Alkyd

New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
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MPI 79	MPI 94	MPI 94
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System DFT: 5.25 mils

#### C. Existing steel that has been spot-blasted to SSPC SP 6:

##### 1. Surface previously coated with alkyd or latex:

Waterborne Light Industrial Coating

MPI REX 5.1C-G5 (Semigloss)

Spot Primer:	Intermediate:	Topcoat:
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MPI 79	MPI 110-G5	MPI 110-G5
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System DFT: 5 mils

##### GALVANIZED SURFACES

#### D. Galvanized surfaces with slight coating deterioration; little or no rusting:

##### 1. Waterborne Light Industrial Coating

MPI REX 5.3J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
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MPI 134	N/A	MPI 110-G5
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System DFT: 4.5 mils

#### E. Galvanized surfaces with severely deteriorated coating or rusting:

##### 1. Waterborne Light Industrial Coating

MPI REX 5.3L-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
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MPI 101	MPI 108	MPI 110-G5
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GALVANIZED SURFACES

System DFT: 8.5 mils

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

F. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified. Match surrounding finish:

1. Alkyd

MPI EXT 5.4F-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 94	MPI 94

System DFT: 5 mils

G. Hot metal surfaces subject to temperatures up to 205 degrees C (400 degrees F):

1. Heat Resistant Enamel

MPI EXT 5.2A

Primer:	Intermediate:	Topcoat:
MPI 21	Surface preparation and number of coats per manufacturer's instructions.	

System DFT: Per Manufacturer

3.8.2 INTERIOR PAINT TABLES

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, and miscellaneous metal items not otherwise specified except hot metal surfaces, and new prefinished equipment:

1. Alkyd

MPI INT 5.1E-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 49	MPI 49

System DFT: 5.25 mils

B. Miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, and new prefinished equipment. Match surrounding finish:

2. Alkyd

MPI INT 5.4J-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 49	MPI 49

System DFT: 5 mils

C. Hot metal surfaces subject to temperatures up to 205 degrees C (400 degrees F):



INTERIOR STEEL / FERROUS SURFACES

1. Heat Resistant Enamel

MPI INT 5.2A

Primer:	Intermediate:	Topcoat:
MPI 21	Surface preparation and number of coats per	
manufacturer's instructions.		
System DFT: Per Manufacturer		

-- End of Section --